

## Prediction of the critical cancers in Northern Saudi Arabia

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### Peer-review Method

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### ABSTRACT

**Background:** Saudi Arabia is witnessing a rapid increase in the overall epidemiology of cancer. Therefore, the present study aimed to determine the key cancers in Northern Saudi Arabia. **Methodology:** In this cross-sectional study, 450 Saudi volunteers were employed throughout the period from October to November 2020. Dates from participants were arbitrarily nominated from the noncombatants living in the municipal of Hail. **Results:** Obtainable of 450 participants, (39.3%) sued that they have close families with cancers, counting (60%), (28.2%), (7.9%), (4%), (2.3%), (1.7%) respectively. **Conclusion:** The furthestmost communal stated cancers via the contestants are leukemias, lung, breast, stomach, colorectal, and others. The status of cancer acquaintance and mindfulness is scarce at the municipal sordid. Additional movements are considered obligatory, together with testing the conceivable menace features for the stated cancer and hovering the inhabitant's health-education and cancer mindfulness.

**Keywords:** Cancer, Awareness, Saudi Arabia, cancer epidemiology

## 1. INTRODUCTION

Cancer is evolving as a primary health-care system challenge with an increasing global burden. The prevalence of cancer is also increasing in all parts of the Arabian states, including Saudi Arabia. The epidemiology of cancer in Saudi Arabia is inconsistent as cancer the registry still incomplete. The prevalence rates of breast cancer, colon cancer, prostate, thyroid cancer, lymphomas, brain cancer, and renal cancer were 53%, 50.9%, 42.6, 12.9%, 12.4%, 9.6%, and 4.6%, respectively (Alqahtani et al., 2020). Many factors have contributed to cancer's etiology in Saudi Arabia, including environmental factors, genetic factors, dietary factors, tobacco use, alcohol consumption, obesity, physical inactivity, etc. (Almutlaq et al., 2017; Alqahtani et al., 2020; Ahmed el al., 2020). As most of the cancer-related risk factors are common worldwide, the substantial rise in the epidemiology of cancer might be related to the lifestyle pattern. Lack of awareness and cancer-related educational programs can potentially impact the increasing burden of cancer in Saudi Arabia (Alshammari et al., 2019; Althubiti et al., 2018).



Most of the studies evaluating the awareness, dealt with few cancers in Saudi Arabia, including breast cancer, colorectal cancer, and oral cancer. Studies from Northern Saudi Arabia reported a lack of knowledge of several breast cancer risk factors among the Saudi community, necessitating an urgent need to determine cancer educational programs (Alrashidi et al., 2017; Alsareii et al., 2020). Another study has reported inadequate knowledge of Saudi towards early colorectal checkups (Alshammari et al., 2020). The epidemiology of oral cancer varies significantly in different Saudi Arabia regions with an overall low awareness level (Alshehri et al., 2020). Therefore, the present study aimed to determine the critical cancers in Northern Saudi Arabia.

## 2. MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in the Hail region, Northern Saudi Arabia. About 450 participants were recruited for this study during the period from October to November 2020. The volunteers were randomly selected from the civilians living in the city of Hail. Information was randomly assembled from various community meeting places irrespective of age or sex. After signing a written ethical consent, each contributor was interviewed to get the needed variables. Attained variables were recorded using a purposeful questionnaire.

### Data Analysis

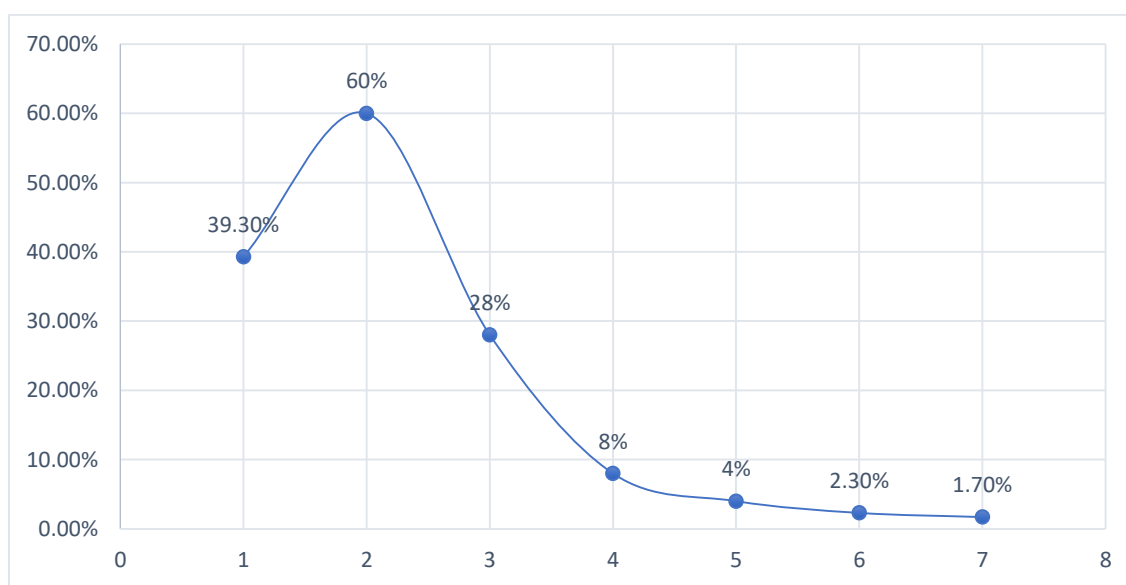
Following arranging the data in a standard master sheet, the variables were entered into SPSS software for analysis. Percentages, frequencies, cross-tabulations were obtained.

### Ethical consent

The study did not include the usage of any human materials. Each participant agreed to participate has signed a written ethical consent before the interview to take the information. The study's protocol was approved by the ethics committee of the College of Medicine, University of Hail, Saudi Arabia. Ethical Committee approval number: EC00069A.

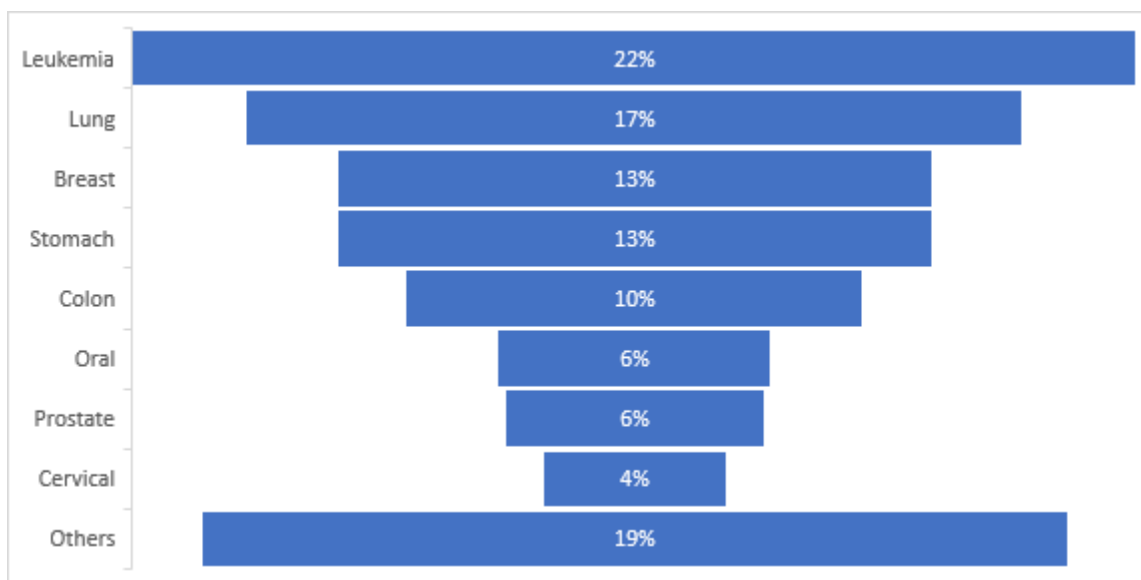
## 3. RESULTS

The study included 450 participants (350 males and 100 females) aged 18-75 years with a mean age of 31 years. Out of 450 participants, 177/450(39.3%) claimed that they have relatives with cancers, including 99/177(60%), 50/177(28.2%), 14/177(7.9%), 7/177(4%), 4/177(2.3%), and 3/177(1.7%) with one relative, two relatives, three relatives, four relatives, five relatives, and six relatives, respectively (Figure 1).



**Figure 1** Description of the participants' proportions by the number of relatives with cancer (horizontal axis).

The frequency of the reported cancers was 194 cancer cases. Most frequented reported cancers were leukemias followed by lung, breast, stomach, colon, oral, prostate, cervical, and other scattered cancers, representing 43/194(22%), 33 (17%), 25(13%), 25(13%), 19 (10%), 12(6%), 11(5.7%), 8 (4%), and 37(19%) respectively (Figure 2).



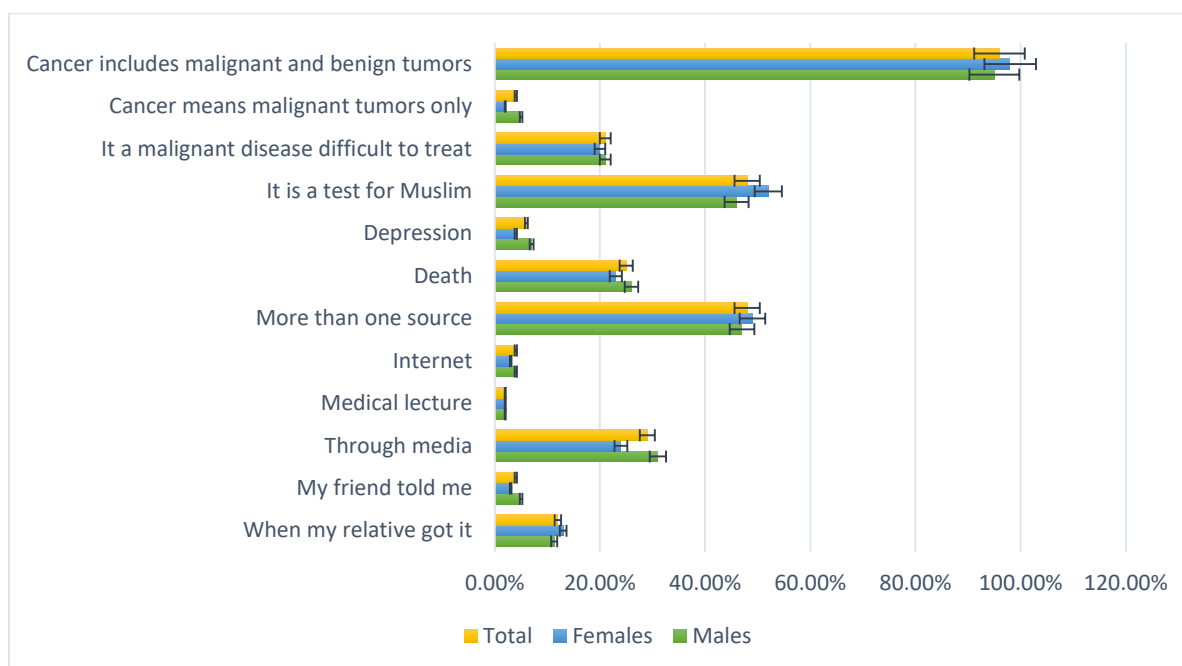
**Figure 2** Description of the proportions of the reported cancers

On asking the participants "How did you know about cancer" the majority of participants (both sex) got it from more than one source followed by through media, and when a relative got it, constituting 173/359 48.2(%), 105/359(29.2%), and 43/359(12%) respectively, as indicated in Table 1, Fig 3. On asking the participants "What does it cancer means?" about 210/439(48%), it is a test of patience and removal of sins for Muslim followed by death and it a malignant disease challenging to treat representing 110/439(25%) and 90/439(21%), in that order. For differentiation between malignant and benign tumors, most participants believed that "Cancer includes malignant and benign tumors" 426/443(96.2%), as indicated in Table 1 and Fig 3.

**Table 1** Distribution of the study population by general cancer knowledge and gender

Variable	Males	Females	Total
<i>How did you know cancer?</i>			
When my relative got it	30	13	43
My friend told me	13	3	16
Through media	81	24	105
Medical lecture	6	2	8
Internet	11	3	14
More than one source	124	49	173
Total	265	94	359
<i>Cancer means</i>			
Death	87	23	110
Depression	24	4	28
It is a test of patience and removal of sins for Muslim	158	52	210
It a malignant disease difficult to treat	71	20	90
Total	340	99	439
<i>Malignant and benign tumors</i>			
Cancer means malignant tumors only	16	1	17
Cancer includes malignant and benign tumors	328	98	426
Total	344	99	443

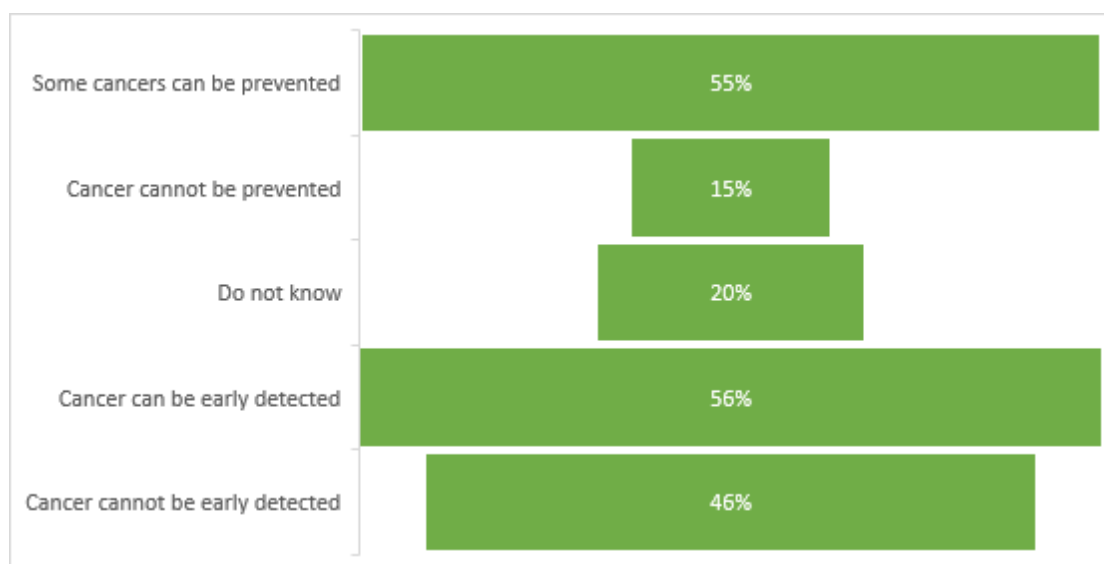
Table 2 and Fig 4 summarized the study population's distribution by gender and knowledge about cancer prevention and early detection. About 195/368(53%) participants believe that "Some cancers can be prevented," whereas 52/368(14%) and 121/368(33%) believe that "Cancer cannot be prevented" and "Do not know," in this order. About 266/435(61%) believe that "Cancer can be early detected," and the remaining 169/435(39%) believe that "Cancer cannot be early detected."



**Figure 3** The study population by general cancer knowledge and within entire gender

**Table 2** Distribution of the study population by gender and knowledge about cancer prevention and early detection

Variable	Males	Females	Total
<i>Cancer prevention</i>			
Some cancers can be prevented	154	41	195
Cancer cannot be prevented	43	9	52
Do not know	83	38	121
Total	280	88	368
<i>Cancer can be early detected</i>			
Yes	187	79	266
No	150	19	169
Total	337	98	435



**Figure 4** the study population by gender and knowledge about cancer prevention and early detection

#### 4. DISCUSSION

In recent years, Saudi Arabia witnessing a rapid increase in the overall epidemiology of cancer in most parts of the country resulting from the complexity of risk factors (Althubiti et al., 2018). As there are no unique cancer registries in most regions of Saudi Arabia, the current investigation was to predict the most common cancers in Northern Saudi Arabia by indicating the prevalence of cancers through relatives reporting. Consequently, about 39.3% of the participants claimed to have relatives with cancer for a few previous years.

In the present study, the most frequently mentioned cancer was leukemia representing 22%. Both males and females are involved in this significant change in the epidemiology of cancers in Saudi Arabia. A recent study from Saudi Arabia reported that hematologic cancers are among the leading five prevalent cancers in Saudi Arabia, involving leukemias and lymphoma (Chaudhri et al., 2020). The incidence of childhood acute lymphoblastic leukemia was increasing in Saudi Arabia at a higher rate than that reported from the United States ( $p < 0.001$ ) (Jastaniah et al., 2020; Alabdulwahab et al., 2020).

Lung cancer was reported by 17% of the participants in the present study. Lung cancer represented 3.9% of all cancers diagnosed in 2014, ranking it as the 4<sup>th</sup> most frequent cancer in males and 17<sup>th</sup> in females (Jazieh et al., 2019). The escalating burden of lung cancer incidence in Saudi Arabia might be influenced by the potential economic movement, which may afflict the cancer prevention and control actions (Da'ar et al., 2019). Although breast cancer is the leading cancer in Saudi Arabia, it was reported by 13% of the participants in the current investigation. Breast cancer is leading cancer among women in Saudi Arabia. The breast cancer incidence was reported to be 25.9%, with 18.2% death rates among Saudi women (Alanazi et al., 2020). Stomach cancer was also reported by 13% of the participants in the current study. The incidence of gastric cancer was reported to be 2.7% of all cancers diagnosed in 2013, as reported by Saudi cancer report (Abuderman, 2019).

Colon cancer was reported by 10% of the participants. Colorectal cancer is leading cancer in men and 3<sup>rd</sup> in women in Saudi Arabia. Notably, the incidence is increasing each year, particularly among younger females (Alsanea et al., 2015; Al-Zalabani, 2020). On the other hand, variables measuring cancer knowledge and cancer awareness showed a low level necessitating the urgent need for health education programs, particularly cancer risk factors and early detection. Many Saudi Arabia surveys reported a lack of awareness of the most common cancers, such as breast and colorectal cancers. Lifestyle changes and lack of awareness are significant factors that are contributing to the substantial upsurge in the overall epidemiology of cancer in Saudi Arabia (Alshammari et al., 2019). Consequently, urgent calls for implementing cancer education and awareness programs addressing healthy lifestyle models and the most common cancer risk factors in each region at the community base may decrease cancer's overall burden in Saudi Arabia.

Although the present study provided a map for the most common cancers in Northern Saudi Arabia for orientation of further action, it has some limitations, including its cross-sectional setting.

#### 5. CONCLUSION

The most common reported cancers by the participants are leukemias, lung, breast, stomach, colorectal, and others. The level of cancer knowledge and awareness is deficient at the community base. Further actions are deemed necessary, including testing the possible risk factors for the mentioned cancer and raising the population's health-education and cancer awareness.

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#### Author Contributions

All authors conceived of the presented idea, investigate and supervised the findings of this work. Elsbali and Ahmed wrote the manuscript. Elsbali supervised the project Shalabi, Mohammed and Abbas developed the theoretical formalism, performed the analytic calculations and performed the numerical simulations. Alrashad, Alharbi, Alyahyawi and Ahmed devised the project, the main conceptual ideas, computational framework and proof outline. Elsbali worked out almost all of the technical details, and performed the numerical calculations for the suggested study. Alrashad, Alharbi and Alyahyawi worked out the bound for quantum mechanics, with help from Shalabi, Mohammed and Abbas verified the numerical results. All authors performed the

analysis, drafted the manuscript and designed the figures. All authors discussed the results and commented on the manuscript, contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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### Conflict of Interest

The authors declare that there are no conflicts of interests.

### Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

### Ethical approval

The study was approved by the Medical Ethics Committee of the College of Medicine, University of Hail, Saudi Arabia. Ethical Committee approval number: (EC00069A).

### Data and materials availability

All data associated with this study are present in the paper.

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